

Notice of Allowability

Application No.

10/765,148

Examiner

Eric F. Winakur

Applicant(s)

CHO ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-21.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date See Continuation Sheet
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Continuation of Attachment(s) 3. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date: 1/28/04; 5/5/04; 7/6/04 (2); 11/12/04; 12/16/04; 3/16/05; 4/15/05; 6/8/05.

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Alan Schiavelli on 11 January 2007. Applicant agreed to amend the claims to avoid including recitations in the claims that improperly include the subject as part of the claimed structure. The amendments were not intended to limit the scope of the claims, nor were they made to avoid any of the references of record.

The application has been amended as follows:

Claim 1 was amended as follows:

1. An optical measurement apparatus comprising:
 - a first light source for producing light of a first wavelength ~~that is irradiated~~ and adapted for irradiating onto a light incident point on the surface of an examined subject;
 - a second light source for producing light of a second wavelength ~~that is irradiated~~ and adapted for irradiating onto said light incident point on the surface of said subject from a direction different from that of the light of said first wavelength;
 - a first photodetector ~~on which~~ adapted for receiving reflected light of the light of said first wavelength reflected by said light incident point and scattered light of the light of said second wavelength ~~are incident~~;

a second photodetector adapted for receiving reflected light of the light of said second wavelength reflected by said light incident point and scattered light of the light of said first wavelength; and

a third detector adapted for receiving light leaving out of a region on the surface of said subject that is away from said light incident point.

In claim 2, line 4, "wherein" was changed to -- configured so that --.

In claim 4, line 1, "wherein" was changed to -- configured so that --.

Claim 5 was amended as follows:

5. The optical measurement apparatus according to claim 4, wherein an outgoing end of said first optical fiber, outgoing end of said second optical fiber, incident end of said third optical fiber and incident end of said fourth optical fiber are disposed near the plane of a cone whose apex corresponds to said light incident point on the subject surface when said apparatus is properly positioned with respect to said subject.

Claim 6 was amended as follows:

6. The optical measurement apparatus according to claim 4, further comprising a fifth optical fiber for transmitting the light leaving out of said region on the subject surface away from said light incident point to said third detector, wherein an incident end of said fifth optical fiber is disposed at such a position as to be in contact with the subject surface when said apparatus is properly positioned with respect to said subject.

Claim 7 was amended as follows:

7. The optical measurement apparatus according to claim 6, wherein, when said apparatus is properly positioned with respect to said subject, the distance between said

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light incident point on the subject surface and the incident end of said fifth optical fiber is larger than the distance between said light incident point and the incident end of said third optical fiber or the incident end of said fourth optical fiber.

Claim 11 was amended as follows:

11. The optical measurement apparatus according to claim 10, wherein the third detector is positioned such that measurement error due to the thickness of the skin is ~~corrected using~~ correlated with the intensity of light measured by said third detector.

Claim 13 is amended as follows:

13. A blood sugar level measuring apparatus comprising:

(1) a heat amount measuring portion for measuring a plurality of temperatures derived from the body surface in order to obtain information that is used in calculating the amount of convective heat transfer and the amount of radiation heat transfer related to the dissipation of heat from the body surface;

(2) a blood flow volume measuring portion for obtaining information concerning the volume of blood flow;

(3) an optical measuring portion for obtaining the hemoglobin concentration and hemoglobin oxygen saturation in blood, said portion including a light source for generating light of at least two different wavelengths, an optical system for irradiating the body surface with light emitted by said light source, and at least three different photodetectors for detecting the light that has been shone on the body surface;

(4) a storage portion for storing the relationships between individual parameters corresponding to the multiple temperatures, blood flow volume, hemoglobin concentration and hemoglobin oxygen saturation in blood, and blood sugar levels;

(5) a computing portion for converting the measurement values provided by said heat amount measuring portion, said blood flow volume measuring portion, and said optical measuring portion into the aforementioned parameters, and computing a blood sugar level by applying said parameters to said relationships stored in said storage portion; and

(6) a display portion for displaying the blood sugar level computed by said computing portion, wherein

said optical measuring portion includes a first light source producing light of a first wavelength and adapted for emitting the light on a light incident point on the subject surface, a second light source producing light of a second wavelength and adapted for emitting the light on said light incident point on the subject surface from a direction different from that of the light of said first wavelength, a first photodetector, a second photodetector, and a third photodetector, ~~wherein~~ configured so that

reflected light of the light of said first wavelength reflected by said light incident point and scattered light of the light of said second wavelength are incident on said first photodetector;

reflected light of the light of said second wavelength reflected by said light incident point and scattered light of the light of said first wavelength are incident on said second photodetector; and

said third photodetector is adapted to detect light that leaves out of a region on the subject surface that is away from said light incident point.

In claim 15, line 1, "wherein" was changed to -- configured so that --.

Claim 16 was amended as follows:

16. The blood sugar-level measuring apparatus according to claim 15, wherein an outgoing end of said first optical fiber, outgoing end of said second optical fiber, incident end of said third optical fiber and incident end of said fourth optical fiber are disposed near the plane of a cone whose apex corresponds to said light incident point on the subject surface when said apparatus is properly positioned with respect to said subject.

Claim 17 was amended as follows:

17. The blood sugar-level measuring apparatus according to claim 15, further comprising a fifth optical fiber for transmitting the light leaving out of said region on the subject surface away from said light incident point to said third detector, wherein an incident end of said fifth optical fiber is disposed at such a position as to be in contact with the subject surface when said apparatus is properly positioned with respect to said subject.

In claim 21, line 3, "wherein" was changed to -- configured so that --.

2. The following is an examiner's statement of reasons for allowance: Applicant cites several references related to determination of blood sugar level. Of particular relevance, Oosta et al. (USPN 5,725,480) teach use of temperature measurements,

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among other factors, to calibrate optical glucose measurements based upon a subject's skin type. Cho (WO 01/28414) suggests determining glucose concentrations based upon analysis of temperature and spectral measurements. In addition, Steuer et al. (Figure 29), Cheng et al. (Figure 3), and Hueber (Figure 2) teach optical measurement arrangements that include an arrangement of multiple emitters and detectors. However, none of the prior art teaches or suggests an optical measurement arrangement wherein first and second light sources are adapted to irradiate a light incident point on the subject either from different directions or in a time-divided manner and first, second, and third photodetectors are arranged such that a first photodetector receives reflected light from the first light source and scattered light from the second light source, the second photodetector receives reflected light from the second light source and scattered light from the first light source, and the third photodetector is adapted to receive light at a region that is away from the light incident point, or a blood sugar level measuring apparatus incorporating such an arrangement, in combination with the other claimed elements.

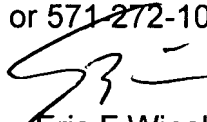
Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric F. Winakur whose telephone number is 571/272-4736. The examiner can normally be reached on M-Th, 7:30-5; alternate Fri.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni Mantis-Mercader can be reached on 571/272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Eric F Winakur
Primary Examiner
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